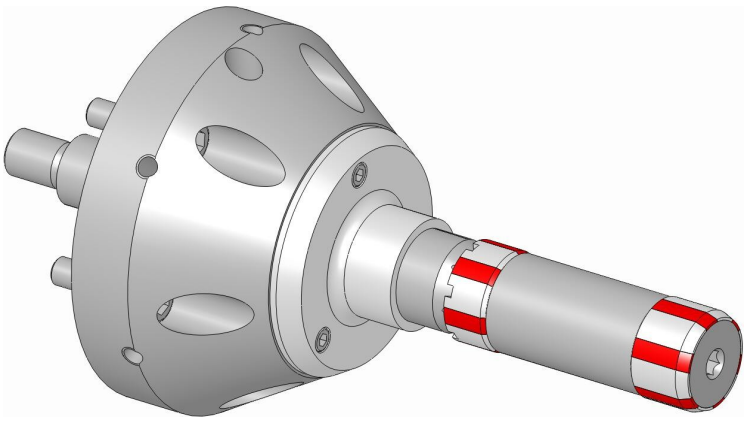
HAINBUCH
SPANNENDE TECHNIK



Installation manual

DKS mandrel

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»Translation of original installation manual«

1 General

1.1 Information about this manual

This manual enables safe and efficient handling of the clamping device.

The manual is a component of the clamping device and must be kept in the immediate vicinity of the clamping device where it is accessible for personnel at all times. Personnel must have carefully read and understood this manual prior to starting all tasks. The basic prerequisite for safe work is compliance with all the safety instructions and handling instructions in this manual.

Illustrations in this manual are provided for a basic understanding and may deviate from the actual model of the clamping device.

It is assumed that the reader is familiar with standard procedures, such as cleaning the mounting surfaces.

1.2 Explanation of symbols

Safety instructions

Safety instructions are indicated by symbols in this operating manual. The safety instructions are introduced by signal words that express the scope of the hazard.

The safety instructions must be strictly adhered to, you must act prudently to prevent accidents, personal injury, and material damage.

DANGER!

… indicates an imminent dangerous situation than can result in death or serious injury if it is not avoided.

WARNING!

… indicates a possible dangerous situation that can result in death or serious injury if it is not avoided.

CAUTION!

… indicates a possible dangerous situation that can result in minor or light injury if it es not avoided.

NOTE!

… indicates a possible dangerous situation that can result in material damage if it is not avoided.

Tips and recommendations

… indicates useful tips and recommendations, as well as information for efficient and trouble-free operation.

1.3 Limitations of liability

All information and instructions in this operating manual have been provided under due consideration of applicable standards and regulations, the current state of technology, as well as our many years of experience.

The manufacturer assumes no liability for damage due to:

- Failure to follow the instructions in the manual
- Non-intended use
- Deployment of untrained personnel
- Unauthorized conversions
- Technical changes
- Use of non-approved spare parts

The actual scope of delivery can vary from the explanations and graphic representations provided in this manual in the case of special versions, if supplemental order options are desired, or on the basis of the latest technical changes.

The agreed obligations in the delivery contract, the general terms and conditions, as well as delivery conditions of the manufacturer, and the statutory regulations valid at the time the contract was concluded, apply.

CAUTION!

Our clamping devices are balanced with balance quality G = 4, in one level n = 1.

The data on the rotation balance refers to rotationally symmetrical work pieces.

The clamping of not rotationally symmetrical work pieces may not be clamped and/or only be clamped after consultation with the manufacturer.

Balancing bolts and balancing weights at the clamping devices may not be removed / disassembled!

1.4 Max. RPM

CAUTION!

The maximum permissible RPM of the clamping device must be redetermined in every application case, on the basis of the clamping forces required for machining.

Of all RPMs of the groups specified, the **lowest given RPM** must always be used.

1.5 Copyright

This manual is protected by copyright and is provided exclusively for internal purposes.

Delivery of the operating manual to third parties, duplication in any form – including excerpts – as well as exploitation and/or communication of the content, are not permitted [except for internal use] without written approval from the manufacturer.

Actions to the contrary make damage compensation mandatory. We reserve the right to enforce additional claims.

1.6 Scope of delivery

All tools and accessories that are not included in the scope of delivery are marked as optional.

In scope of delivery of the clamping device:

- 1 DKS mandrel

Optionally the scope of delivery of the clamping device includes:

- Spindle flange
- Segmented clamping bushings
- clamping station distance sleeve
- Work piece end-stop
- Eye bolts

1.7 Spare parts

WARNING!

Safety risk if the wrong spare parts are used!

Incorrect or defective spare parts can cause damage, malfunction, or total failure; they can also impair safety.

- Only use manufacturer's original spare parts.

Only purchase spare parts from authorized dealers or direct from the manufacturer. Addresses are in the appendix.

1.8 Warranty terms

The warranty terms are included in the manufacturer's terms and conditions.

2 Safety

This section provides an overview o fall the important safety aspects for optimal protection of personnel, as well es for safe and trouble-free operation.

2.1 Responsibility of the customer

The device is used in industrial applications. Consequently the owner of the device is subject to legal industrial safety obligations.

In addition to the safety instruction in this manual, generally valid safety and accident protection guidelines, and environmental protection guidelines must be adhered to and complied with for the area of implementation of the device.

2.2 Personnel requirements

WARNING!

Danger of injury due to insufficient qualification!

Improper handling of the clamping device can cause serious injury or material damage.

- Only have activities performed by personnel who are qualified to perform these activities.

The following qualifications are cited in the operating manual for the various activity areas.

- Specialized personnel
  are personnel who due to their specialized training, skills, and experience, as well as knowledge of the applicable regulations, are capable of executing the tasks assigned to them and of recognizing and avoiding possible hazards on their own.
- Hydraulic specialist
  The hydraulic specialist has been trained for the particular task area in which he is active and is familiar with the relevant standards and regulations. Due to his specialized training and experience the hydraulic special-

ist can perform tasks on hydraulic equipment and recognize and avoid possible dangers on his own.

- **Electric specialist**
  The electric specialist has been trained for the particular task area in which he is active and is familiar with the relevant standards and regulations.
  Due to his specialized training and experience the electric specialist can perform tasks on electric equipment and recognize and avoid possible dangers on his own.

Only persons from whom it can be expected that they reliably execute their work are considered as personnel. Persons whose capability to react is impaired, for instance through drugs, alcohol, or medication, are not approved.

- Comply with age-specific and job-specific regulations that are applicable at the installation site when selecting personnel.

2.3 Intended use

The clamping device is designed for installation in a machine tool. Within the machine tool the clamping device is designed exclusively as a through-bore chuck for bar work and / or as an end-stop chuck for chuck work.

The clamping device should only be mounted, operated, maintained, and cleaned by instructed, specialized personnel.

Intended use also includes compliance with all the instructions in this manual.

The clamping device is to be used for the case of application contractually agreed between the producer/deliverer and the user, as well as such cases of application described in the product description which are also in accordance with the technical values.

The safe function of the clamping device is, as far as it can be foreseen, guaranteed when it is used for the intended purpose in accordance with the appropriate safety regulations.

Any use that extends beyond the intended use, or any other use of the clamping device is considered to be misuse and can cause dangerous situations.

WARNING!

Danger due to misuse!

Misuse of the clamping device can cause dangerous situations.

Particularly refrain from the following uses of the clamping device:

- Use in machines other than machine tools.
- Use in machine tools with technical data other than that specified on the clamping device.

Claims of any type due to damage arising from non-intended use are excluded.

Unintended and improper use of the Power Chuck is for example

- If workpieces are not clamped properly
- If safety regulations are disregarded and persons are working at the Power Chuck without additional protective devices e.g. for machining.
- If a Power Chuck is used for machines or tools for which it is not intended.

2.4 Personal protective equipment

Wearing of personal protective equipment is required to minimize health hazards when working with the device.

- Always wear the protective equipment necessary for the respective task when working with the device.
- Follow the instructions that have been posted in the work area.

Always wear

For all tasks always wear:

Protective work clothing

is tight-fitting work clothing with low resistance to tearing, with tight sleeves, and without projecting parts. It is primarily used to protect against entanglement by moving machine parts.

Do not wear rings, chains, or other jewelry.

Safety footwear

for protection against heavy falling parts and slipping on slippery substrates.

For special tasks wear

Special protective equipment is required when executing special tasks. Separate reference is made to this equipment in the specific sections of this manual. This special protective equipment is explained below:

Hard hat

to protect against falling and flying parts and materials.

Protective goggles

to protect eyes from flying parts and liquid splashes.

Protective gloves

to protect hands from friction, abrasion, puncture wounds, or deeper injuries, as well as from contact with hot surfaces.

2.5 Special dangers

In the following section residual risks are cited that occur due to installation of the clamping device in a machine tool. In each case the residual risks that have been determined based on a risk analysis of the machine must be specified by the customer.

- Follow the safety instructions listed here and the warnings in the other sections of this manual to reduce health hazards and to avoid dangerous situations.

Horizontal / lying parts

WARNING!

Danger of injury due to horizontal parts!

Before transporting the clamping device in horizontal condition:

- Put the clamping device on a non-slip pad
- Screw in the eye bolts

Suspended loads

WARNING!

Life-threatening danger due to suspended loads!

Some clamping devices must be lifted with a crane. When lifting the clamping device there is a life-threatening hazard due to falling parts or parts swinging out of control.

- Never step under suspended loads.
- Comply with the instructions concerning the intended attachment points. Ensure that the sling gear is securely seated!
- Do not attach lifting gear in projecting components.
- Only use approved hoists and sling gear with sufficient bearing capacity.
- Do not use rope and belts that are torn or frayed.

Moving parts

WARNING!

Danger of injury due to moving parts!

Rotating parts of the clamping device can cause serious injuries.

- Do not reach into moving parts or handle moving parts during operation.
- Note the gap dimensions of moving parts.
- Do not open covers when the device is in operation.
- Be aware of afterrun time:
  Prior to opening the covers ensure that all parts have come to a standstill.
- Wear tight-fitting protective work clothing in the danger zone.

Wrong clamping of the work piece

WARNING!

Danger of injury due to incorrect clamping of the work piece!

Incorrect work piece clamping may lead to the ejection of the work piece and result in serious injuries.

Underdimensioned (tolerance) parts can lead to incorrect clamping!

- Check the unmachined work pieces at random on dimensional accuracy.

Too low supply pressure can lead to the reduction of clamping force!

Too high supply pressure can lead to damage of the components of the clamping device!

- Check and adjust, if necessary, the supply pressure regularly.
- Do random checks of the unmachined work pieces on dimensional accuracy.

Missing changing parts

WARNING!

Danger of injury due to missing changing parts!

When operating the clamping device without changing parts [segmented clamping bushing, clamping heads, work piece end-stops] there is a higher danger of crushing injuries due to the stroke of movable components of the clamping device.

- The clamping process may not be initiated without assembled segmented clamping bushing and/or work piece end-stop.

WARNING!

Risk of injury!

When screwing in individual components such as for example work piece end-stops, threaded adapters and similar devices that are equipped with an external thread or wear caused by burrs, there is risk of cutting.

- The operation must be done only by qualified personnel.
- Wearing of gloves / [PSA] is required!

2.6 Further warnings

WARNING!

Risk of injury!

Never start rotating the clamping device without a clamped work piece.

- For operation any available clamping position must be clamped with a suitable work piece.

WARNING!

Risk of injury!

Never reach for the clamping device while the spindle is rotating. Before starting to work on the mandrel, make sure the machine spindle cannot be put in motion.

WARNING!

Risk of injury!

Falling down of the clamping device or its parts can cause severe bruises and fractures.

The dead weight of the clamping device or its parts can lead to high physical stress.

WARNING!

Risk of injury!

Bending in the working area of the machine can cause severe head injuries!

WARNING!

Risk of injury!

By operating the clamping device without changing parts [clamping head, segmented clamping bushing, work piece end-stops ...] there is an increased risk of crushing injuries by the stroke of the moving components of the clamping device.

By uncontrolled discharge of the clamping process [e.g. by incorrect installation of the energy supply or faulty programming] there is an increased danger.

CAUTION

Risk of injury!

When placing the work piece:

- Make sure that the hands / fingers may not be clamped between the flange and the work piece!

WARNING!

Risk of injury!

Remove all tools and gages from the working area of the machine before the machine is started up. Tools and gages that are thrown out of the machine can cause injury.

Damage of seal rings and segmented clamping bushing!

Do not use ester-containing solvents or polar solvents for cleaning the clamping device. Seals and clamping elements could be damaged.

WARNING!

Risk of injury!

Missing o-rings or seals may cause severe injuries!

Due to missing / fallen out O-rings and seals compressed air or hydraulic fluids which are under high pressure may expel!

- Make sure that all O-rings / seals for the hydraulic / pneumatic connections are available and undamaged!
- If necessary lubricate them before assembly and/or during service.

WARNING!

Damage of clamping device!

The clamping device may be released exclusively in the standing condition!

WARNING!

Risk of injury!

With too weak clamping pressure the work pieces may be thrown from the clamping device!

- After assembly turn the clamping pressure to actuating pressure!

Risk of injury!

Material damage due to unintentional startup of the tool spindle!

Unexpected start up of the tool spindle can cause severe injury.

- Make sure that the system is pressure-free and that a restart of the machine can be excluded!

Risk of injury!

Leaking (sprayed out) hydraulic oil can cause serious injury.

- Make sure that all O-rings / seals for the hydraulic and/or pneumatic connections are available and undamaged

Risk of injury!

If the clamping pressure is too low clamped work piece may be thrown out.

If the clamping pressure is too high severe damages of the components of the clamping device may occur the throwing out of the work piece.

- Before operation set the operation pressure back to operation level.
- The operating pressure should be checked and adjusted regularly!

Risk of injury!

Contamination of the mechanism can influence/reduce the stroke, thus the clamping force is reduced and thus, the work piece is not properly tightened and can be thrown out

Risk of injury!

Slipping while the lubricating with a grease gun can lead to severe cuts!

WARNING!

Slipping danger due to escaping hydraulic fluid!

Escaping (sprayed out) hydraulic oil can cause serious injuries.

- Make sure that all o-rings/seals for the hydraulic / pneumatic interfaces are available and in undamaged condition.
- Make sure that the clamping device is empty and leakage of hydraulic fluid is avoided.

Transport!

- For transport always use a suitable clamping means / crane.
- Make sure that a rolling / falling of the clamping device is not possible.

WARNING

Risk of injury due to stored energy!

The clamping device can be designed with disc springs. These disc springs are under permanent tension! The release of the stored energy can cause injuries!

- By loosening the corresponding screws they have to be operated continuously alternately to reduce the clamping pressure to a minimum!
- Particularly cautious approach is required!
- For cleaning and maintenance disassemble the clamping device from the machine!

2.7 Clamping force

The achieved clamping force can vary due to the maintenance condition of the clamping device [state of lubrication and degree of contamination] [see chapter »Maintenance«].

The clamping force must be checked at regular intervals. This requires the use of static clamping force measuring devices.

CAUTION!

Damages due to excessive draw and compressive force!

An excessive draw force and/or compressive force may damage the clamping device.

- The max. draw force and compressive force may not be exceeded.

2.8 Screws

Moving parts

WARNING!

Danger of injury due to screws and stud screws being accelerated out of the device!!

Screws and stud screws radially attached to the clamping device can be accelerated out of the device and cause severe injuries.

- At the clamping device radially mounted screws and stud screws which were loosened for assembly and maintenance must be re-tightened with the correct tightening torque!
- The tightening torque is shown in the assembly drawing of the clamping device or it is engraved on the device itself in the direct vicinity of the screw or stud screw.
- All screws or stud screws that are not marked with a tightening torque specification are tightened with the prescribed tightening torque and locked [medium-strength bonding] in the factory and should only be unscrewed after consultation with the manufacturer. If in doubt you must contact the manufacturer immediately do determine the subsequent procedure.

2.9 Functionality

NOTICE!

With high contamination of the clamping device the functionality is no longer guaranteed.

- The cleaning and maintenance intervals must be observed.

2.10 Environmental protection

NOTE!

Environmental hazard due to incorrect handling!

Incorrect handling of environmentally hazardous substances, particularly improper disposal, can cause significant environmental damage.

- Always comply with the instructions cited below
- If environmentally harmful substances should inadvertently get into the environment, initiate suitable measures immediately. If in doubt notify the responsible municipal authority about the damage.

The following environmentally harmful substances are used:

Lubricants

Lubricants like greases and oils can contain toxic substances. Ensure that they do not get into the environment.

The device must be disposed of by a specialized disposal company.

To achieve trouble-free operational performance of the clamping device only use HAINBUCH lubricants. See the appendix for reference addresses.

3 Technical data

3.1 General information

The clamping device is available in different sizes and variants.

Information about e.g.

- dimensions
- weight

you will find on the corresponding drawing that you can order at HAINBUCH.

3.2 Operating conditions

Environment	Specification	Value	Unit
	Temperature range	15 - 65	°C

3.3 Power specifications

NOTE!

Material damage if the power specifications do not agree!

If the power specifications of clamping device, machine adapter and machine do not agree, severe damage extending to total damage can occur.

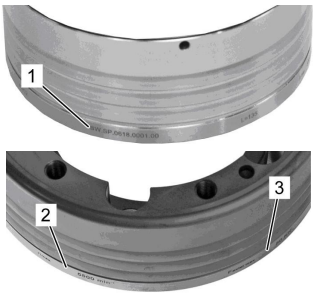
- Only operate clamping devices and adapters in machines with the same power specifications.

Information on maximum clamping force and drawtube force is provided on the clamping device and the adapter.

3.4 Dimensional sheet

Dimension sheets for the respective product can be requested from HAINBUCH.

3.5 Type designation



The type designation is on the product and includes the following information:

1 ID no. [marked with the # symbol]
2 Maximum speed [rpm]
3 Maximum clamping force [kN]

Fig. 1

4 Structure and function

4.1 Overview and brief description

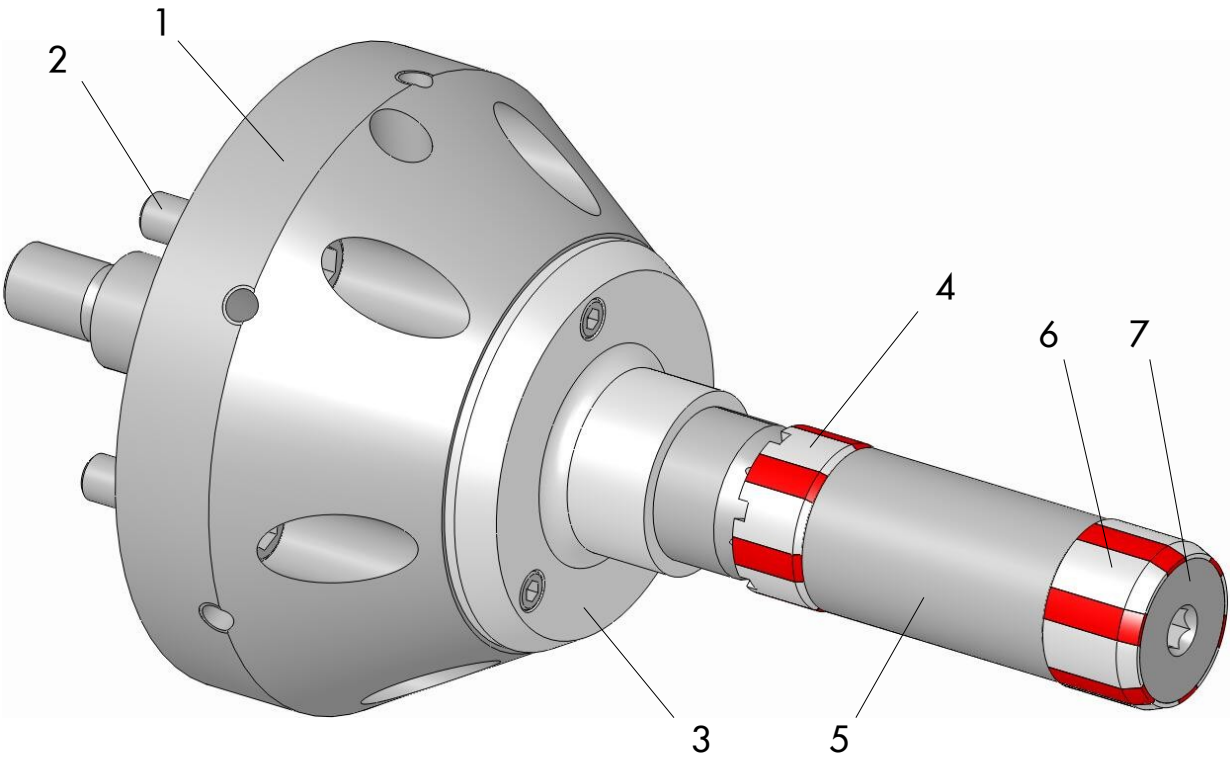


Fig. 2

1. DKS mandrel
2. Allen screws
3. Work piece end-stop
4. Segmented clamping bushing
5. Clamping station distance sleeve
6. Segmented clamping bushing
7. Draw bolt

Brief description

The DKS mandrel is a clamping device with double cone clamping elements; two segmented clamping bushings and two clamping cones are in use.

The DKS mandrel functions according to the pull-back principle. When clamping the work piece is pulled to the work piece end-stop by the pull-back effect.

The first segmented clamping bushing sits on a conical draw bolt. During the clamping process it is expanded by the draw bolt and pulled to the clamping station distance sleeve.

The clamping movement is transmitted to the second segmented clamping bushing, which is pulled against the clamping cone of the mandrels body and expanded thereby.

This clamping flow has the effect that the work piece is centered and aligned by the first segmented clamping bushing. Only with the action of the second segmented clamping bushing the work piece is clamped by the complete clamping force.

This type of segmented mandrels is suitable for internal clamping of long workpieces.

4.2 Optional Accessories

The accessories described here are not included in the scope of delivery.

Specially developed segmented clamping bushings match to the respective maximum RPM are available for each clamping device. Trouble-free and precise function of HAINBUCH clamping devices is only ensured when using original HAINBUCH segmented clamping bushings.

Lubricating grease and grease gun are required for cleaning and preservation of the clamping device. The lubricating grease is also specially matched for protection of the vulcanized segments of the segmented clamping bushings and increase their service life and elasticity by a significant factor.

4.2.1 Segmented clamping bushing

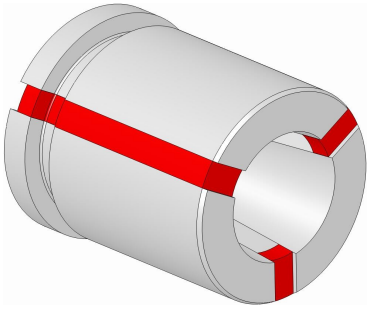


Fig. 3

The segmented clamping bushing is offered with a clamping diameter manufactured according to the customers needs.

4.2.2 Work piece end-stop

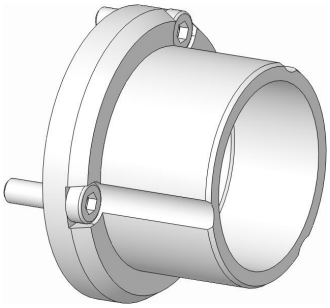


Fig. 4

The work piece end-stop is manufactured with a end-stop dimension according to the customers request. In combination with the segmented clamping bushing and the segmented mandrel it provides a functional unit.

4.2.3 Grease

Fig. 5

The universal grease for chuck and mandrel lubrication is supplied in a 1000g can. The order number for the universal grease is 2085/0003; it can be ordered from HAINBUCH.

5 Transporting, packaging and storing

5.1 Safety instructions for transporting

Unbalanced package

WARNING!

Danger of falling due to an unbalanced package

Packed goods can have an unbalanced package. If attached incorrectly the package can tip and cause life-threatening injuries.

- Note the markings on the packages.
- Attach the crane hook in such a manner that it is located above the center of gravity.
- Carefully lift and see if the load tilts. If necessary change the attachment.

5.2 Symbols on the packaging

Fragile

Identifies packages with fragile or sensitive contents.

Handle the packed goods with care; do not allow them to fall, and do not subject them to impact.

Protect from moisture

Keep packed goods dry and protected against moisture.

5.3 Transport inspection

Check delivery immediately upon receipt to ensure that delivery is complete, and to identify any transport damage.

Proceed as follows it there is apparent external damage:

- Do not accept the delivery, or only accept it with reservation.

- Note the extend of transport damage on the transport documents or on the transport company's delivery ticket.
- Submit a complaint.

Report any defect as soon as it is detected. Claims for damage compensation can only be enforced during the applicable periods for giving notice of lack of conformity.

5.4 Unpacking and inner-company transport

The clamping device is packed vertically and has threaded bores in the end face.

In these threaded bores lifting eye bolts can be screwed in.

To safely lift the clamping device out of the package it must be hooked into a crane depending on the weight.

For transporting with transport trolley the clamping device must be positioned in standing condition. Make sure that a non-slip pad has been laid.

All tools and accessories which are not in scope of delivery are marked as optional in the operating instructions.

- Two people are required for this task.
- Special tools required:
  - Crane from weight 15 kg
  - Lifting eye bolts

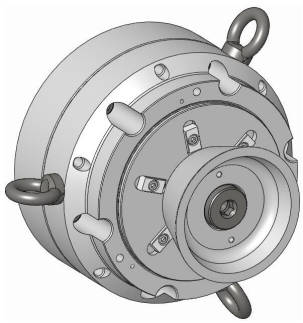


Fig. 6

1. Screw lifting eye bolts into the thread in the circumference of the clamping device.
2. Hook the load-handling equipment into the lifting eye bolts.
3. Use a crane to carefully lift the clamping device out of the transport packaging and put it down on a stable, level substrate.
4. Prevent the clamping device against rolling away.

5.5 Packaging

About the packaging

Individual packages are packed according to the expected transport conditions. Environmentally-friendly materials have been used exclusively for the packaging.

Packaging should protect the specific components from transport damage, corrosion, and other damage until installation. Therefore do not destroy the packaging, remove it just before installation.

The packed goods are sealed in foil airtight and packed in cartons. See the »Technical Data« section for the specific weight of the respective sizes.

Handling packaging materials

Dispose of packaging materials in accordance with the respectively valid statutory regulations and local guidelines.

NOTE!

Improper disposal causes environmental damage!

Packaging materials are valuable raw materials and in many cases they can be reused, or they can be effectively treated and recycled.

- Dispose of packaging materials in an environmentally responsible manner.
- Comply with locally applicable disposal guidelines. If necessary commission a specialized company to dispose of packaging.

5.6 Storing

Under certain circumstances instructions for storage and subsequent storage are affixed to the packages that extend beyond the requirements cited here.
Comply with these instructions accordingly.

Storage of packages

Only store packages under the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free location
- Do not expose to aggressive media
- Protect from direct sunlight
- Avoid mechanical vibration
- Storage temperature: 15 bis 35 °C
- Relative humidity: max. 60 %
- For storage periods longer than 3 months:
  - Check the general condition of all parts and the packaging at regular intervals.
  - Touch up or re-apply anti-corrosion agents as needed

Subsequent storage of the clamping device

Only re-store the clamping device under the following conditions:

- Thoroughly clean the clamping device prior to subsequent storage [see section »Cleaning«]
- Thoroughly oil and grease the clamping device. [see section »Cleaning«]
- Store the clamping device in airtight foil
- The clamping device must be stored securely in position. If this is not guaranteed, use a suitable container for the clamping device or equip the shelf with a circumferential securing edge.

6 Assembly

6.1 Preparations

The total weight of the clamping device, consisting of spindle flange and clamping unit, depends on the size and can be as much as 50 kg.

Depending on the weight, to safely lift the clamping device out of the package and position it in the machine it must be hooked into a crane.

WARNING!

Danger of injury due to falling components!

When mounting components can fall and cause severe injury and material damage.

- Two people are always required for this task.
- Use a crane.

If the clamping device is delivered in combination with a flange, the flange must be assembled before the clamping device!

Special tools required:

- Allen wrench
- Oil stone
- Crane
- Eye bolts

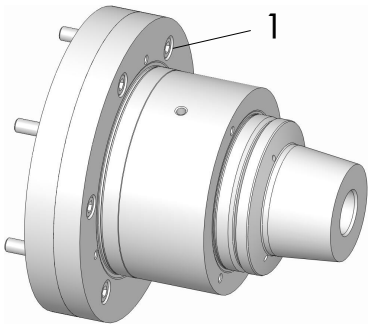


Fig. 7

1. Loosen, unscrew and remove the allen screws [1] in the clamping device; use an allen wrench.

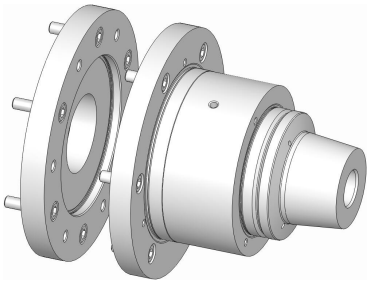


Fig. 8

2. Remove the flange from the clamping device.
3. Clean the mating surfaces at flange and clamping device with a soft, lint-free cloth and remove all oil and grease residues.
4. Hone the mating surfaces on the spindle flange with an oil stone.

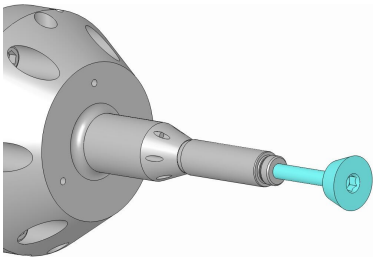


Fig. 9

5. Unscrew the draw bolt from the clamping device.

WARNING

Risk of injury due to stored energy!

The clamping device can be designed with disc springs. These disc springs are under permanent tension! The release of the stored energy can cause injuries!

- By loosening the corresponding screws they have to be operated continuously alternately to reduce the clamping pressure to a minimum!
- Particularly cautious approach is required!
- For cleaning and maintenance disassemble the clamping device from the machine!

6.2 Assembling of the clamping device

WARNING!

Danger of injury due to unintentional startup of the tool spindle!

Unexpected start up of the tool spindle can cause severe injury.

- Prior to switching on automatic mode close all protective doors or hoods that are present on the machine tool.
- Unscrew all eye bolts from the clamping device and remove them from the interior of the machine.
- Only run the machine in set-up mode or jog mode.

6.2.1 Assembling the flange [optional]

NOTE!

Material damage due to wrong tightening torque of the allen screws in the spindle flange!

The tightening torque of the allen screws is prescribed by the spindle or machine manufacturer. Incorrect tightening torque of the allen screws in the flange can cause significant material damage on the clamping device and on the machine.

- Only tighten the allen screws of the spindle with the torque prescribed by the spindle or machine manufacturer.

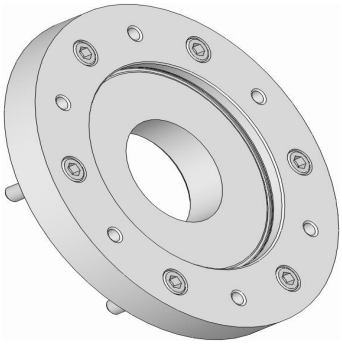


Fig. 10

1. Put the machine in set up mode.
2. Wipe off the mating survaces of the machine spindle with a soft, lint-free cloth and remove all oil and grease residues.
3. Lift the flange into the machine by hand or with the aid of a crane and place it on the machine spindle. Position the flange on the machine spindle with the aid of the bores.
4. Screw all allen screws into the flange wit an allen wrench and hand tighten in a cross pattern.

NOTE!

Material damage is possible if the ring nuts are left in the spindle flange!

Ring nuts that are left in the clamping device can significantly damage or even destroy lathe, clamping device and work piece.

- Always remove ring nuts immediately after mounting the clamping device in the lathe.

6.2.2 Assembly of the DKS mandrel

Two people are required for this task!

Special tools required:

- Allen wrench
- Crane
- Eye bolts

WARNING!

Crushing danger due to machine movement!

Due to the design of the draw tube a gap may result between draw tube adapter and clamping device / clamping unit. When assembling the clamping device / clamping unit there is a high risk squeezing danger. Due to this gap there is a high risk of crushing, which can lead to serious injuries.

- Never reach into the gap between the machine / spindle flange and clamping device!

1. Put the machine in set up mode.
2. Remove all tools from the interior of the machine.
3. Set the clamping pressure of the machine tool on the lowest setting.
4. Move the draw tube of the machine tool into front stop position.
5. Put the segmented mandrel on the pre-assembled flange [optional] on the machine spindle by using a crane.
6. Screw in all allen screws into the segmented mandrel with an allen wrench and tighten them only finger-tight in a cross pattern.

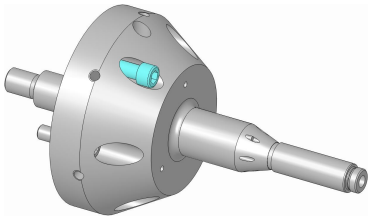


Fig. 11

6.2.3 Checking and adjusting the concentricity

NOTE!

Material damage due to insufficient face run and concentricity!

Due to insufficient face run and concentricity work pieces can be damaged during processing.

- After each mounting check, and if necessary re-adjust, the face run and concentricity of the clamping device.

Special tools required:

- Dial indicator
- Plastic tip hammer
- Torque wrench

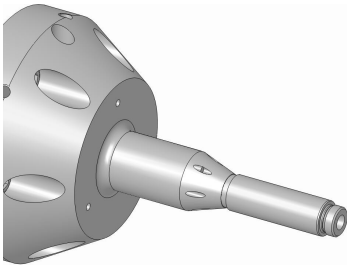


Fig. 12

1. Place the magnetic base of the dial indicator on the inside of the machine.
2. Place the dial indicator [2] for concentricity on the clamping taper [1].
3. Adjust the segmented mandrel in such a manner that the dial indicator shows the value »0«.

For exact adjustment, if necessary loosen the allen screws several turns and retighten in a cross pattern.

6.2.4 Assembling of the work piece end-stop

Special tools required:

- Torque wrench

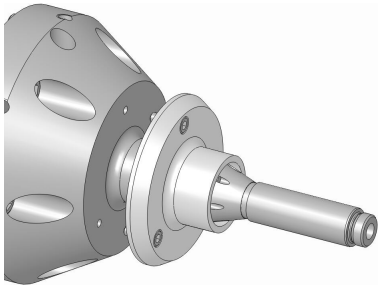


Fig. 13

1. Put the machine tool in set up mode.
2. Remove all tools from the interior of the machine.
3. Set the clamping pressure of the machine tool on the lowest setting.
4. Move the drawtube of the machine tool into the front stop position.
5. Put the work piece end-stop on the segmented mandrel.

6. Screw in all allen screws into the work piece end-stop with an allen wrench and tilgten them clockwise with an allen wrench [see section »Screw tightening torque«].

6.2.5 Assembly of the changing parts

Special tools required:

- Wrench or allen wrench

1. Put the machine in set up mode.
2. Remove all tools from the interior of the machine.
3. Set the clamping pressure of the machine on the lowest setting.
4. Move the drawtube of the machine tool into the front stop position.

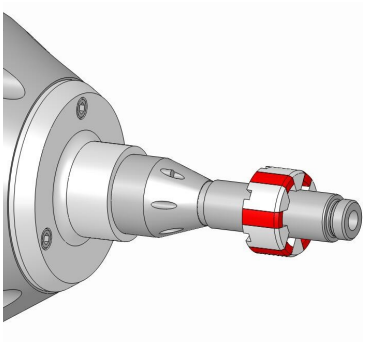


Fig. 14

5. Put the rear segmented clamping bushing on the mandrel.

Position the segmented clamping bushing by the positioning pin at the segmented mandrel!

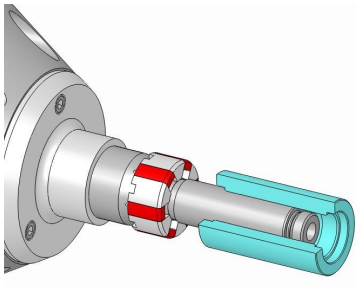


Fig. 15

6. Put the clamping station distance sleeve on the mandrel till end.

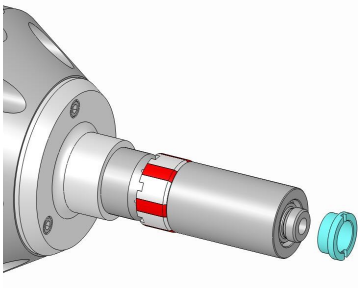


Fig. 16

7. Screw the stroke limit ring on the mandrel to secure the segmented clamping bushing and the clamping station distance sleeve.

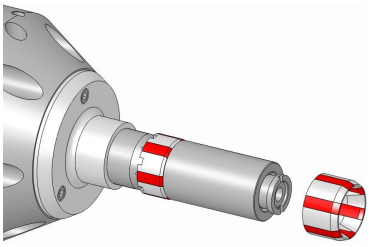


Fig. 17

8. Put the front segmented clamping bushing on the mandrel.

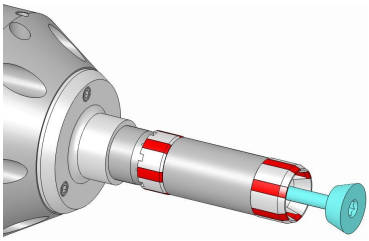


Fig. 18

9. Screw in the draw bolt through the front segmented clamping bushing into the mandrel till end stop.
10. Tighten the draw bolt by using a wrench [not in scope of delivery].

Risk of injury!

Extra long clamping devices may be unstable during machining.

- For the clamping of long work pieces always use a tailstock and a clamping guard!

WARNING!

Risk of injury due to uncontrolled machine movement!

With manual loading of the clamping device with a work piece uncontrolled machine movement can cause serious injury.

- The manual loading must be done in the jog mode!

6.3 Work piece

WARNING!

Risk of injury due to thrown out parts!

During clamping of the work piece and the processing parts can be thrown and cause severe injuries and property damage.

- Check the clamping diameter of the work piece.
- Tighten only work pieces that meet the dimensional requirements.
- For clamping very long work pieces use in addition a tailstock / a steady rest for support.
- Do not exceed the maximum clamping pressure.
- Make sure that the correct supply pressure [neither too high nor too low] is set.

6.4 Inspections

NOTE!

Material damage due to damaged clamping devices!

A damaged, incomplete, or unbalanced clamping device can significantly damage or even destroy the machine tool and the work piece.

- Only install undamaged, complete, and precisely balanced clamping devices.
- If in doubt contact the manufacturer.

Ensure the following points prior to each installation and start-up of the clamping device:

- All allen screws of the clamping device must be present and tightened with the proper tightening torque.
- The balance screws of the clamping device must all be present and undamaged.
- All rubber segments must be intact; this means that they are neither torn, nor are they porous at any point.
- All edges and bearing surfaces are intact; this means that they are neither broken nor do they show any

signs of wear.

- The set speed of the machine tool should not exceed the maximum permissible speed of the clamping device.
- The maximum drawtube force specified on the perimeter of the clamping device must not be exceeded.
- The clamping pressure of the machine must be sufficiently high.
- All mounting tools must be removed from the interior of the machine.
- Clamping device and work piece must be compatible – check the clamping diameter regularly.
- The work piece must be clamped into the clamping device with sufficient work piece tension.

6.5 Control of the stroke position

WARNING!

Crushing danger from moving parts!

Crushing danger from moving parts during controlling the stroke position!

Gaps, caused while controlling the stroke position, can cause severe injury.

- Only do the controlling of the stroke position with assembled changing parts.
- Only run the machine in set-up mode or jog mode.

6.6 Activities after production is concluded

1. Move the clamping device into unclamped position.
2. Switch off the machine tool and safeguard it from being switched on again.
3. Open the protective door or hood.
4. Clean the clamping device of chips and production residues with a soft, lint-free cloth.
5. Close the protective door or hood.

7 Disassembly, subsequent storage, disposal

If there is break in production that lasts longer than 3 days, or if the machine will be changed ver for other work pieces, the clamping device must be disassembled and properly stored in accordance with the manufacturer's specifications [see section »Transport, packaging, storage«].

Prior to disassembling:

- Put the machine in set up mode.
- Remove fuels and auxiliary materials, as well as residual processing materials and dispose of these items in an environmentally-responsible manner.

7.1 Safety

Safeguarding against restart

DANGER!

Life-threatening danger if restarted without authorization

When disassembling there is danger of the energy supply being switched on inadvertently. This poses a life-threatening hazard for persons in the danger zone.

- Prior to starting the tasks switch off all energy supplies and safeguard them from being switched on again.

WARNING!

Danger of injury due to falling components!

When mounting components can fall and cause severe injury and material damage.

- Two people are always required for this task.
- Use a crane.
- For assembly on a vertically suspended spindle always use a suitable mounting aid.

DANGER!

Risk of injury by released energy!

Risk of injury during the disassembling of the balance weight due to released energy.

- Pay attention to the safety instruction during the disassembly of the stroke limit screw.

WARNING

Risk of injury due to stored energy!

The clamping device can be designed with disc springs. These disc springs are under permanent tension! The release of the stored energy can cause injuries!

- By loosening the corresponding screws they have to be operated continuously alternately to reduce the clamping pressure to a minimum!
- Particularly cautious approach is required!
- For cleaning and maintenance disassemble the clamping device from the machine!

7.2 Disassembling the clamping device

7.2.1 Disassembly of the changing parts

Special tools required:

- Wrench or allen wrench

1. Put the machine in set up mode.
2. Remove all tools from the interior of the machine.
3. Set the clamping pressure of the machine on the lowest setting.
4. Move the drawtube of the machine tool into the front stop position.

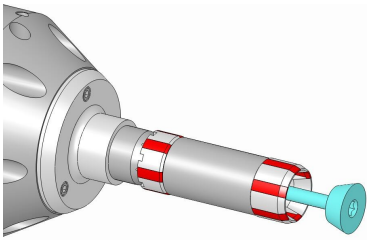


Fig. 19

5. Loosen the draw bolt by using a wrench [not in scope of delivery].
6. Unscrew the draw bolt through the front segmented clamping bushing out of the mandrel.

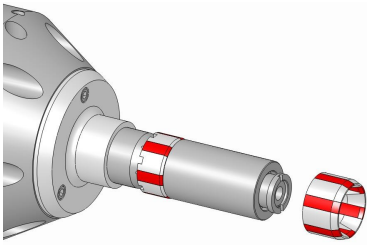


Fig. 20

7. Remove the front segmented clamping bushing from the mandrel.

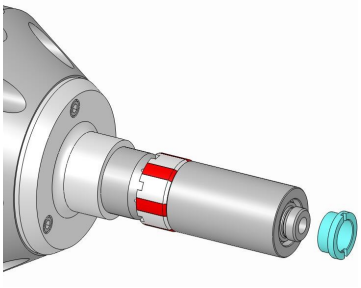


Fig. 21

8. Unscrew the stroke limit ring from the mandrel.

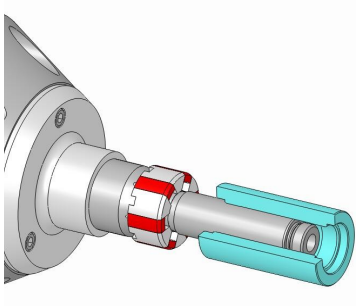


Fig. 22

9. Remove the clamping station distance sleeve from the mandrel.

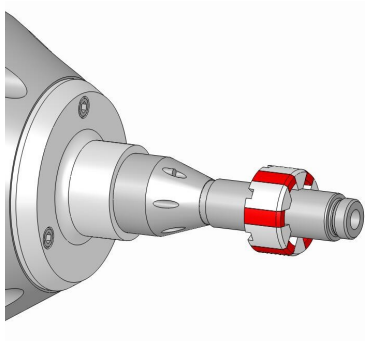


Fig. 23

10. Remove the rear segmented clamping bushing from the mandrel.

7.2.2 Disassembly of the work piece end-stop

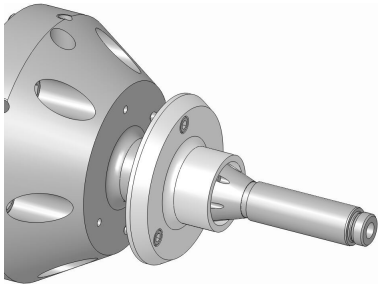


Fig. 24

Special tools required:

- Torque wrench

1. Put the machine tool in set up mode.
2. Remove all tools from the interior of the machine.
3. Set the clamping pressure of the machine tool on the lowest setting.
4. Move the drawtube of the machine tool into the front stop position.
5. Loosen and remove the allen screws.
6. Remove the work piece end-stop from the segmented mandrel.

7.2.3 Disassembly of the DKS mandrel

Two people are required for this task!

Special tools required:

- Allen wrench
- Crane
- Eye bolts

WARNING!

Crushing danger due to machine movement!

Due to the design of the draw tube a gap may result between draw tube adapter and clamping device / clamping unit. When assembling the clamping device / clamping unit there is a high risk squeezing danger. Due to this gap there is a high risk of crushing, which can lead to serious injuries.

- Never reach into the gap between the machine / spindle flange and clamping device!

1. Put the machine in set up mode.
2. Remove all tools from the interior of the machine.
3. Set the clamping pressure of the machine tool on the lowest setting.
4. Move the draw tube of the machine tool into front stop position.
5. Loosen and remove the allen screws from the segmented mandrel.
6. Remove the segmented mandrel from the flange [optional] and/or the machine spindle by using a crane.

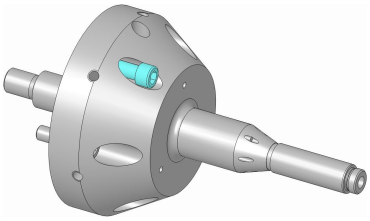


Fig. 25

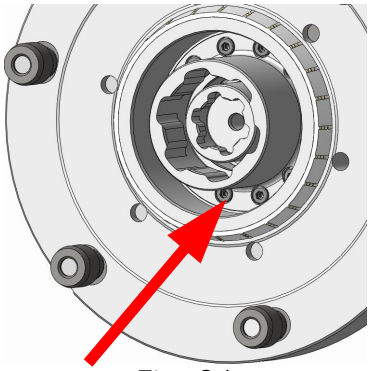


Fig. 26

WARNING!

Risk of injury!

The draw mechanism of the DKS mandrels is possibly reinforced by springs / spring assemblies. The DKS mandrel is thus under permanent tension!

- The allen screws of the cover [Fig.26] may only be opened by qualified personnel!
  Procedure: gradually crosswise.

7.2.4 Disassembling the flange [optional]

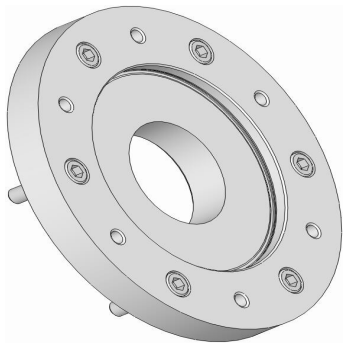


Fig. 27

1. Put the machine tool in set up mode.
2. Loosen, unscrew and remove the allen screws.
3. Remove the flange by hand from the machine spindle.
4. Wipe off the mating surfaces at the machine spindle with a soft, lint-free cloth and remove all oil and grease residues.

7.3 Subsequent storage of the clamping device

The clamping device must be cleaned and treated with corrosion protection for subsequent storage [see section »Cleaning«].

NOTE!

The storage conditions are specified in the section »Transport, packaging and storage«.

7.4 Disposal

If a return or disposal agreement has not been concluded, then recycle disassembled components.

Risk of injury due to leaking fluids!

Hydraulically or pneumatically operated clamping devices may contain residues of liquids. Uncontrolled leakage of fluids can lead to severe injuries.

- Open the pressure relief screw and drain remaining liquid.
- Discard the liquid.

NOTE!

Improper disposal causes environmental damage!

Lubricants and other auxiliary materials are subject to treatment as special waste, and should only be disposed of by approved specialist companies!

Local municipal authorities or specialized disposal companies provide information on environmentally-responsible disposal.

8 Maintenance

Environmental protection

Comply with the following instructions for environmental protection when performing maintenance work:

- At all lubricating points where lubricant is applied by hand, remove escaping, used, or excess grease, and dispose of it in accordance with applicable local regulations.
- Collect used oil in suitable containers and dispose of it in accordance with applicable local regulations.

8.1 General

Cleanliness of the appropriate end-stop as well as the guidance diameters are conditions for reaching the concentricity and perpendicularity tolerances. Clean these surfaces with an appropriate cleaner.

CAUTION

Danger of injury due to improper handling of cleaners!

Improper handling of cleaners can cause health impairments.

- Always comply with the safety data sheets and guidelines provided by the manufacturer of the cleaning agent for handling/using the cleaners.

CAUTION

Danger of injury due to loss of clamping force!

Fouling of the clamping device can cause the clamping device to lose considerable clamping force.

- Always comply with the maintenance and cleaning intervals specified in this manual.
- In conjunction with the maintenance intervals, regularly check the maintenance status of the clamping device through clamping force measurements.

NOTE!

Material damage due to use of the wrong cleaning agent/cleaner!

Seals and clamping elements can be damaged due to use of the wrong seals and clamping elements.

- Do not use any solvents that contain ester or polar solvents for cleaning purposes.

CAUTION

Risk of injury!

Pollution can cause a significant loss of clamping force of the clamping device.

- Pay attention to the maintenance and cleaning intervals of the clamping device.
- As part of this service intervals a regular review of the maintenance status of the adapter due to static tension-measuring devices is absolutely necessary!

WARNING

Risk of injury due to stored energy!

The clamping device can be designed with disc springs. These disc springs are under permanent tension! The release of the stored energy can cause injuries!

- By loosening the corresponding screws they have to be operated continuously alternately to reduce the clamping pressure to a minimum!
- Particularly cautious approach is required!
- For cleaning and maintenance disassemble the clamping device from the machine!

8.2 Cleaning

NOTE!

Material damage if cleaned with compressed air!

Cleaning the clamping device with compressed air can force metal chips into thread and grooves. This can damage or even destroy the clamping device.

- Never clean the clamping device with compressed air!

- Auxiliary material required:
  - Ester-free, non-polar cleaning agent
  - Soft, lint-free cloth

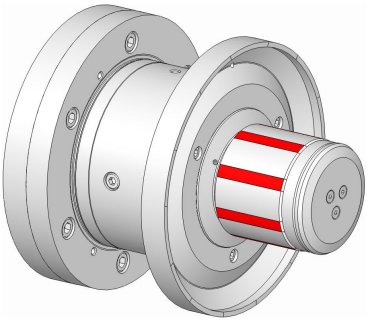


Fig. 28

1. Disassemble the clamping device [see section »Disassembling the clamping device«].
2. Clean all components listed below with cleaning agent and a cloth; remove all oil and grease residues:
   - Flange
   - Clamping unit
   - Taper of the segmented mandrel
   - Reception and inner thread for the clamping unit in the segmented mandrel
   - Work piece end-stop
   - Allen screws

8.3 Preservation

- Special tools required:
  - Universal grease 2085/0003
  - Grease gun
  - Oil stone
  - Soft, lint-free cloth

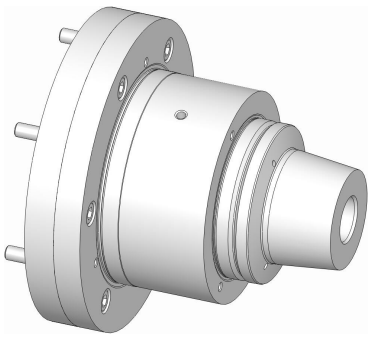


Fig. 29

1. Disassemble the clamping device [see section »Disassembling the clamping device«].
2. Hone all the bearing surfaces of the clamping device with an oil stone.
3. Lightly grease all allen screws. Remove excess grease with a cloth.
4. Remount the clamping device.
5. Screw all allen screws into the clamping device again and tighten them finger-tight.

   ! For subsequent storage tightening the allen screws finger-tight suffices. This facilitates re-commissioning and protect the allen screws.
6. Lightly grease all interior and outer surfaces of the clamping device. Remove excess grease with a cloth.
7. Pack the clamping device airtight in foil. Place it on a level, impact-free storage location and safeguard it from falling.

8.4 Use of lubricant

With the usage of lubricant you may only use grease that corresponds to the requirements concerning bond, pressure-stability and solubility in lubricating coolant.
In addition no dirt particles may be in the grease; they cause run errors if they come in in-between two mating surfaces.
We recommend for this the following lubricant:

HAINBUCH grease

see product information

In addition to the weekly lubrication cycle, we recommend to remove the chuck body once a month from the spindle flange, to clean the springs (C) in order to assure a consistent function of the opening of the work.

8.5 Maintenance schedule

Maintenance tasks are described in the sections below that are required for optimal and trouble-free operation.

If increased wear is detected during regular inspections, then reduce the required maintenance intervals according to the actual indications of wear.

Contact the manufacturer, [see the service address on the back] if you have questions concerning maintenance tasks and intervals.

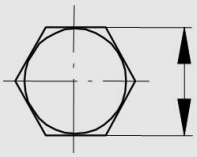
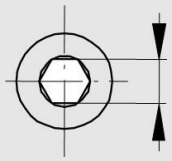
Interval	Maintenance task
Daily	Visual inspection and complete cleaning in case of heavy contamination [see section »Cleaning«], especially at the clamping and end-stop face to avoid damages at the clamping device and the clamping elements early.
Each 36 operating hour	Clean the clamping device and the clamping unit [see section »Cleaning«].
	Clean the clamping taper [see section »Cleaning«].
	Grease the clamping device [see section »Preservation«].
Every 6 months	Completely disassemble and clean the clamping unit [see section »Cleaning«].

8.6 Bolt torque

Metric ISO thread

The guide values for bolt tightening torque for achieving the highest permissible pre-tension for metric ISO thread are specified in Nm in the table.

- Total friction coefficient μ_{tot} = 0,12
- 90% utilization of the apparent limit of elasticity

Diameter	 [mm]	 [mm]	Torque for screw quality 10.9 [Nm]
M 4	7	3	4
M 5	8	4	7
M 6	10	5	12
M 8	13	6	25
M 10	17	8	50
M 12	19	10	100
M 16	24	14	220
M 20	30	17	400
M 24	36	19	600

The table shows the maximum permissible values and does not include any other safety factors. Knowledge of the applicable guidelines and configuration criteria are the prerequisites.

9 Trouble shooting

Possible fault causes and the tasks to correct these faults are described in the following section.

If faults occur more frequently, the maintenance intervals must be shortened to correspond to the actual system load.

Contact the manufacturer if there are faults that cannot be corrected by following the instructions below; see the service address on the back of this operating instruction.

9.1 Safety

Trouble shooting

The following always applies:

1. For faults that pose a direct danger for personnel and or property immediately execute the emergency-stop function.
2. Determine the cause of the fault.
3. If correction of the fault requires work in the danger zone, put the machine in set-up mode.
4. Immediately inform the responsible parties at the installation site of the fault.
5. Depending on the type of fault, either have authorized specialized personnel correct the fault, or correct it yourself.

   The trouble shooting table provided below lists personnel who are authorized to correct the fault.
6. If there is a fault that was not caused by the clamping device the cause of the fault may be in the machine area. See the operating manual for the machine in this regard.

9.2 Trouble shooting table

Fault	Possible cause	Fault correction	Corrected by
Clamping unit cannot be changed	Safety screw not loosened.	Unscrew the safety screw a bit [see section »Disassemble the clamping unit«].	Specialist
Clamping device does not open or release stroke is insufficient	Fouling between the draw mechanism and the clamping unit	Remove the clamping unite, move the drawtube back and clean the coupling area [see section »Disassembling the clamping unit«].	Specialist
	Dimensional deviation of the drawtube adapter	Check the dimensions of the drawtube adapter and correct them if necessary.	Specialist
Clamping force is too low	Work piece is over-dimensioned	Replace with a suitable clamping unit	Specialist
	Insufficient hydraulic pressure on the clamping cylinder	Check the machine side hydraulic aggregate	Hydraulic specialist
	Defective clamping cylinder or blocked drawtube	Contact the machine manufacturer	Machine manufacturer
Eccentric dimensional deviation on the work piece	Concentricity error of the segmented mandrel	Check the concentricity at the taper of the segmented mandrel, correct if necessary [see section »Checking and adjusting the face run and the concentricity«].	Specialist

Fault	Possible cause	Fault correction	Corrected by
Dimensional deviation on the work piece	Contaminated coupling area	Clean the coupling area of the clamping device [see section »Cleaning«].	Specialist
	Contaminated clamping taper	Disassemble the clamping unit and clean the clamping taper [see section »Cleaning«].	Specialist
Formal defect on the work piece	Elastic deformation of feedstock that is subject to formal defects. After machining the workpiece returns to its original form.	Use feedstock with fewer formal defects. If technically justifiably reduce the clamping pressure.	Specialist
Marks on the clamping surface	Point or linear work piece clamping	Replace with a clamping unit that has a smoother clamping surface	Specialist
	Excessive dimensional difference between the work piece diameter and the clamping bore	Replace with a clamping unit that has a suitable clamping bore	Specialist

9.3 Start-up after corrected fault

After correcting the fault execute the following steps to start up again:

1. Reset the emergency-stop device
2. Acknowledge the fault on the machine tool controller
3. Ensure that no one is in the danger zone
4. Start the machine tool

10 Appendix

10.1 Service Hotline

Order Hotline

Quickly ordered and delivered. A call is all it takes: +49 [0]7144. 907-333

Schedule Hotline

Current status of your order? Just call: +49 [0]7144. 907-222

24h emergency call

Has there been a crash or other technical emergency? Our experts are at your service around the clock: +49 [0]7144. 907-444

10.2 Representatives in Germany and Europe

The sales partners and service employees listed below are available for further consultation or support.

Overview of German postal codes:

J	010 – 049	C	400 – 479	O	710 – 719	H	868 – 879
M	060 – 089	A	480 – 499	D	720 – 729	D	880 – 899
J	090 – 189	C	500 – 549	L	730 – 739	E	900 – 914
I	190 – 289	N	550 – 559	M	740 – 479	L	915 – 918
B	290 – 319	C	560 – 569	F	750 – 799	E	919
A	320 – 339	K	570 – 599	H	800 – 839	G	920 – 949
B	340 – 349	N	600 – 659	G	840 – 851	E	950 – 979
N	350 – 369	F	660 – 699	H	852 – 866	M	980 – 999
B	370 – 399	L	700 – 709	L	867		

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